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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Michael Lynn Hinds

Examiner: Roger L. Pang

Serial No.: 09/881,115

Group Art Unit 3681

Filed: 06/14/2001

(Atty. Ref. No. 15745-US)

For: MAGNETIC PROTECTION FOR HYDRAULIC SEAL

Moline, IL 61265

2 July 2003

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7/15/03

APPEAL BRIEF

The Honorable Commissioner

of Patents and Trademarks

Washington, D.C. 20231

Sir:

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Real Party in Interest

07/15/2003 DNASH1 00000000 040000 09001115
01 FC:1402
The real party in interest is Deere & Company to whom this application was assigned by the applicant per the assignment document recorded in the United States Patent and Trademark Office on 06/14/2001 at REEL/FRAME 011917/0657.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Amendments

07/15/2003 DNASH1 00000000 040000 09001115
01 FC:1401
A first amendment, filed on 09 December 2002, was entered in its entirety and considered in the Final Rejection, dated 22 April 2003.

Status of Claims

Claims 1-16 are pending in this application.

Claims 1-4 and 9-12 are rejected.

Claims 5-8 and 13-16 are objected to as being dependent upon a rejected base claim.

This appeal is from the rejection of claims 1-4 and 9-12.

A copy of the appealed claims is set forth in the attached Appendix.

Summary of the Invention

The present invention, as defined in the appealed claims, resides in the combination of: 1) a gear box having a low section having a bottom wall, a rotatable shaft extending through the bottom wall and being coupled to gearing, and a seal located for preventing oil from leaking along an interface including a surface section of the shaft where it enters the bottom wall, with 2) a contaminant collector having magnetic characteristic mounted in the gear box in a location closely adjacent a top surface of the seal so as to intercept and collect ferric contaminants before they engage the seal.

Referring to FIGS. 1, there is shown a typical transmission 10 used for driving the cutting blades 22 of a pair of base cutting assemblies 18 of a sugar cane harvester. The gear box 12 of the transmission includes a shallow, horizontal upper section 14 which is joined to a pair of well sections 16.

Referring now also to FIGS. 2 and 3, it can be seen that each of the base cutting assemblies 18 includes a vertical drive shaft 20 which extends upwardly through a bottom wall of a given well section and 16 has an upper end section supported for rotation in an upper wall of the gear box 12. Located in the upper section 14 of the gear box 12, and respectively mounted to the tops of the drive shafts 20, are gears 32 and 34, these gears being respectively meshed with a pair of meshed idler gears 32. Respectively located about the shafts 20 and pressed into respective openings provided in the bottoms of the gear box well sections 16 are a pair of sleeves 48. Provided for sealing the interface between each shaft 20 and the associated sleeve 48 is a seal 52 made of an elastomeric material. Pressed onto each shaft 20 at a location just above the seal 52 is a contaminant collector 52.

Referring also to FIG. 4, it can be seen that each contaminant collector 52 is in the form of a ring having a ring 56, which is U-shaped in vertical cross section, whereby a channel is formed. The bight of the channel is provided with a plurality of angularly spaced holes 60 to permit the flow of oil through them. Located within the channel and fixed to the bight at locations between the holes 60 are a plurality of magnets 58.

In operation, any ferric contaminants which result from gear wear, for

example, will gravitate into the wells 16 and be attracted by the magnets 58 before reaching the seals 52. This will prevent the seals 52 from being abraded by contaminants, which, in the absence of the contaminant collectors 54, would be carried about by the rotating drive shafts 20 at their respective interfaces with the associated seal 52.

Issues

1. Are claims 1, 2, 9, and 10 unpatentable under 35 U.S.C. 103(a) as being unpatentable over applicant's prior art admission in view of Hauser et al.?
2. Are claims 3, 4, 11, and 12 unpatentable under 35 U.S.C. 103(a) as being unpatentable over applicants prior art admission in view of Hauser et al. and Van De Venne et al.?

Grouping of the Claims

Rejected claims 2 and 10 respectively depend from independent claims 1 and 9, and will respectively stand with an allowance of these independent claims.

Claims 2, 3, 4, 10, 11, and 12 are thought individually allowable.

Arguments as to the Issues

Issue 1

It is submitted that the rejection of claims 1, 2, 9, and 10 as being unpatentable under 35 U.S.C. 103(a) as being unpatentable over applicant's prior art admission in view of Hauser et al. is untenable.

Specifically, among other structure, claims 1 and 9 each set forth a known environment including a gearbox having a low section (cl. 1) or well (cl. 9) provided with a **bottom wall, a drive shaft extending through the bottom wall** and coupled to gearing and a seal located for preventing oil from leaking along the surface of the shaft where it enters the gear box. In combination with this known structure is claimed a contaminant collector having a magnetic characteristic and being mounted in the gear box at a location above and closely adjacent a top surface of the seal so as to intercept and collect ferric contaminants before they engage the seal.

Hauser et al. disclose a hydrostatic transmission for a tractor including a pump 11 having a main casing 21 through the **top** of which is mounted an input drive shaft 24 (FIG. 3) coupled for driving the pistons 28 of the pump 11. The pump 11 is

provided with a bypass valve arrangement including a pair of check balls 20 respectively at the pressure/return ports 25 of the pump. A filter housing 30 is in fluid communication with the check balls 20 and contains a filter for **filter ring contaminants** from fluid flowing through it. A bypass operator 40 is provided for selectively opening the check balls 20 and includes a bypass rod 52 pivoted by means of an external arm 54 (FIG. 8). The rod 52 is provided with an offset crank section 53 that acts through a plunger 51 that is joined to bypass actuator 40, the actuator having tabs 46 at its opposite ends located for engaging and opening the check balls in response to pivoting the rod 52. Instead of the bypass actuator 40, a member (not shown) extending directly through the bottom of the casing 21 could be located for directly engaging the tab 51. A magnet 55 is mounted on the bypass rod 52 and functions as a washer to assist in maintaining rod 52 in the housing, while also acting to **filter loose metal parts from** the hydraulic fluid.

It is submitted that there is no teaching in Hauser et al. to position the magnet above a seal mounted at the surface of a rotating drive shaft extending through the bottom wall of a gear box, but that Hauser et al. merely teach the idea of placing a magnet in an oil sump to collect contaminants. Thus, it is submitted that it would not have been obvious to one skilled in the art to have located a magnet in the acknowledged prior art arrangement of a gear box, gear drive shaft, and seal, as set forth in claims 1 and 9, so as to be above the seal for preventing metal contaminants from gravitating to the seal where they would act to abrade the seal due to the rotating drive shaft. There is absolutely no suggestion in Hauser et al. that a contaminant collector be placed for protecting a seal from abrasion. It appears the Examiner has used applicant's own teaching in arriving at the proposed combination to reject the claims, and such hindsight has long been held impermissible.

Claims 2 and 10 respectively depend from claims 1 and 9 and are likewise thought allowable. Claims 2 and 10 are thought allowable for the additional reason that each requires the contaminant collector to be mounted to the **gear drive shaft** and there is no teaching in Hauser et al. that the magnet disclosed therein be mounted to a drive shaft. While the bypass rod 52 of Hauser et al. does carry the magnet 55, the rod is not a gear drive shaft, and it oscillates instead of rotates.

Issue 2

The rejection of claims 3, 4, 11, and 12 as being unpatentable over applicant's

admitted prior art in view of Hauser et al. and Van De Venne et al. is thought erroneous for the reasons that: (1) claims 3 and 4 respectively depend directly and indirectly from claim 2, claims 11 and 12 respectively depend directly and indirectly from claim 10, and Van De Venne et al. does not overcome the above-discussed deficiencies of Hauser et al.; and (2) claims 3 and 11 each require the contaminant collector to include a ring press fit onto the drive shaft and such a structure is not thought obvious from Hauser et al. and Van De Venne et al. taken alone or in combination, and each of claims 4 and 12 each require the ring of the contaminant collector to have a magnetic component fixed to it as an integral part, and no such structure is thought obvious from Hauser et al. or Van De Venne et al.

Hauser et al. do not teach the idea of connecting a magnet for rotation with a gear drive shaft. Other than stating that magnet 55 can optionally be secured on the rod 52 by means of a tab (see column 7, lines 7-13), Hauser et al. does not disclose the specifics of how the magnet 55 is connected to the rod 52 (see FIGS. 2 and 3 for the assembled parts). The magnet 55 is **itself** a ring, but there is no teaching of a **separate** ring to which a magnetic member is fixed.

Van De Venne et al. disclose an electrically driven air pump wherein pump impellers 7, 8 are press-fit on a shaft 11, with the connection being augmented by an adhesive 14 placed in grooves 13 provided in the hubs 9, 10 of the impellers. No contaminant collector having a magnetic characteristic is disclosed by Van De Venne et al.

Because Hauser et al. do not teach the idea of connecting a magnetic contaminant collector to a gear drive shaft and would have no need to do so with the manually oscillated rod 52, it is submitted that it would not have been obvious to one skilled in the art to have sought out a teaching, such as that disclosed in Van De Venne et al., of press-fitting a component for rotation with a drive shaft. Again, it appears that the Examiner has resorted to applicant's own teaching in arriving at the combination used for rejecting claims 3 and 11.

Claims 4 and 12 respectively depend from claims 3 and 11 and are likewise thought allowable. Claims 4 and 12 are thought allowable for the additional reason that, because neither Hauser et al. nor Van De Venne et al. disclose the idea of constructing a contaminant collector from a ring to which at least one magnet is fixed, it would not have been obvious to have modified applicant's acknowledged prior art structure by providing a contaminant collector in the form of a ring press fit

onto the drive shaft, with at least one magnet secured to the ring.

For the reasons stated above, appellant respectfully requests that the Examiner's rejections of the claims be reversed.

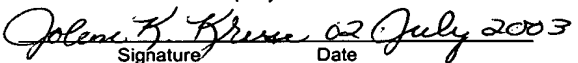
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Respectfully,


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APPENDIX

Claims under Appeal

1. In a gearbox containing gearing and having a low section having a bottom wall, a rotatable drive shaft extending through said bottom wall and being coupled to said gearing, and a seal located for preventing oil from leaking along an interface including a surface section of the shaft where it enters said bottom wall of the gearbox, the improvement comprising: a contaminant collector having magnetic characteristics being mounted in said gearbox in a location closely adjacent a top surface of said seal so as to intercept and collect ferric contaminants before they engage the seal.

2. The gearbox defined in claim 1 wherein said contaminant collector is mounted for rotation with said shaft.

3. The gearbox as defined in claim 2 wherein said contaminant collector includes a ring press fit onto said shaft.

4. The gearbox defined in claim 3 wherein said magnetic characteristic is achieved by there being at least one magnetic component fixed as an integral part to an upper surface of said ring.

9. In a sugar cane base cutter assembly including a gearbox provided with an upper, horizontal section extending between and joining a pair of depending wells, each well having a bottom wall, an upper drive shaft section of a base cutter leg being rotatably mounted in each bottom wall, and a seal being located on each shaft section at an associated bottom wall for preventing leakage of oil from said gearbox along the shaft section, the improvement comprising: a contaminant collector having a magnetic characteristic being mounted above and closely adjacent each seal so as to intercept ferric contaminants settling towards the associated seal.

10. The base cutter assembly defined in claim 9 wherein each of said contaminant collectors is mounted for rotation with an associated one of the shaft sections.

11. The base cutter assembly defined in claim 10 wherein said contaminant collectors each include a ring press fit onto said associated one of the shaft sections.

12. The base cutter assembly defined in claim 11 wherein said magnetic characteristic of each contaminant collector is achieved by at least one magnet being

fixed to each ring.